

APPENDIX R

MITIGATION MONITORING AND REPORTING PROGRAM

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I. INTRODUCTION

This mitigation monitoring and reporting program (MMRP) is being prepared pursuant to Section 21081.6 of the California Environmental Quality Act Statutes (PRC §§21000-21178.1). The reporting and monitoring program is designed to ensure compliance with project mitigation measures during project implementation. The adoption of the monitoring program is a requirement at the time findings are made for a Final EIR prior to certification of the Final EIR. The Final MMRP will have a level of specificity for a large number of detailed measures which have yet to be worked out between the government agencies and the applicant. Therefore, the MMRP as it is attached to the Final EIS for distribution at an earlier date (January 1999) contains a Draft MMRP, rather than a Final MMRP. The draft plan is designed to contain enough specific information about the MMRP to demonstrate that the final plan will show how it will be possible to assure that PALCO will stay in compliance with the detailed and complex provisions of the HCP/SYP on an ongoing, daily basis. The plan includes penalties and remediation for non-compliance, but it is primarily designed to reduce the incidence of violations to a level far below what has been experienced in the past. The plan addresses the following issues raised by commenters on the Draft EIS/EIR:

- Adequacy of funding over the life of the permit to carry out mitigation monitoring provisions
- Difficulty of oversight because of the complexity of HCP provisions
- Difficulty of oversight because of scale of property, timber, and other operations
- Inadequate staffing of government agencies to provide appropriate level of oversight
- Involvement of public interest groups and the public

The MMRP references two major components of the HCP/SYP that will require monitoring: (1) *compliance* with habitat protection provisions and (2) *effectiveness monitoring* of protective measures, so that these measures can be modified if they are not effective enough or if an altered measure would give an adequate degree of resource protection. The effectiveness monitoring includes (3) *trends* monitoring for such biological functions as northern spotted owl and coho populations, fine sediment accumulation, streambed elevation, and water temperatures. These are detailed in the HCP (Appendix P) and below (Section III). In addition (4) *adaptive management* will be used to change elements of the conservation plan in response to determination of effectiveness of current elements of the conservation plan for protecting and restoring stream conditions and fish and wildlife populations.

The Plan will be implementable and enforceable because its provisions are mostly numerical tree requirements or restricted zones that can be delineated on maps and in the field. Registered professional foresters or others familiar with forestry and the landscape have the expertise to delineate the zones in question. Timber operators can be trained to understand the markings and follow the restrictions that they entail. Oversight and enforcement are to be provided by objective third parties who are either independent consultants under contract to the public wildlife agencies, but paid for by the company, or by the wildlife agency personnel whose labor for the monitoring is paid for by the company.

It is not feasible (as some commenters suggested) to have members of conservation groups (e.g., Sierra Club, Audubon Society) or the public do the monitoring directly. There is no way that these groups could be granted appropriate access to the property. In addition, logging roads on which logging equipment is operating, and timber operations in the woods are inherently hazardous. The company or their insurance provider could not assume the liability for injuries or deaths resulting from such public involvement in monitoring activities. The public will be able to participate, however, through input to the reporting process. Monitoring reports will be filed as frequently as is necessary to

demonstrate compliance (see the details for each individual measure, below). The public will have the right to review the monitoring reports and provide input to the ongoing mitigation process by commenting on the company's compliance and the effectiveness of the conservation and mitigation measures.

II. COMPLIANCE MONITORING

Below is a list of items from the Pacific Lumber HCP/SYP that have to be monitored for compliance:

- Aquatic Species Related Measures
 - ◆ Control of sediment from roads and other sources
 - ◆ Road construction, maintenance, improvements and abandonment requirements
 - ◆ Road stormproofing
 - ◆ Wet weather road use
 - ◆ Hillslope management
 - ◆ Surface erosion in riparian areas
 - Channel migration zones
 - Class I, II and III stream buffer provisions
 - ◆ Tree retention
 - ◆ No salvage or exemption harvest*
 - ◆ Snag and downed log retention (LWD)
 - ◆ Equipment exclusion zone
 - ◆ Prohibition on use of herbicides and pesticides
 - ◆ Suspension yarding
 - ◆ One entry every 20 years
 - ◆ Single tree selection harvest
 - ◆ Basal area requirements
- Terrestrial Species Related Measures
 - Marbled murrelet
 - ◆ No harvest or salvage in the MMCAs*
 - ◆ No helicopter yarding in MMCAs
 - ◆ Prohibition on new haul roads in MMCAs
 - ◆ Restrictions on new borrow pits and rock quarries in MMCAs
 - ◆ Properly licensed game hunting only
 - ◆ Noise restrictions in quarries in Allen Creek MMCA
 - ◆ Vegetative buffers for murrelet habitat in public reserves
 - ◆ Seasonal restrictions on timber operations adjacent to nesting habitat
 - Northern spotted owl
 - ◆ Habitat retention requirements
 - ◆ Buffer requirements around nest sites and activity centers
 - List A Wildlife Species
 - ◆ Survey requirements
 - ◆ Buffer requirements around active nest sites
 - ◆ Seasonal restrictions on harvest around active nest sites

* Except as agreed to by the FWS, CDFG, and CDF

The compliance monitoring will include some or all of the following, as appropriate to each measure: survey, planning, delimiting in the field, instructing field personnel/operators in implementing the measure, oversight, follow-up review, reporting, and remediation/remedies for non-compliance. For the purpose of the plan, these activities are defined as follows:

Survey – to conduct appropriate biological studies of the area to which the measure applies to determine whether the resource is present that would trigger the implementation of the measure and the need for monitoring. Surveys will be conducted according to HCP-specified protocols by qualified company or third-party biologists. Oversight will be provided by third-party or agency biologists to verify the results of survey. The types of surveys that will be needed for implementation of mitigation measures are listed below:

Activities or areas subject to survey as part of compliance monitoring:

- MMCA boundaries
- Active murrelet nests within and outside MMCAs
- Nesting northern spotted owls
- Nest sites and rookeries for List A wildlife
- Wintering bald eagle use areas

Plan – To fully develop the practical aspects of implementation and monitoring of the measure with all of the affected parties participating (e.g., company management, timber operator or contractor, compliance forester, outside consulting monitor, and/or biologists)

Delimit – To place markings in the field (THP areas) delineating areas to be protected, restricted areas etc. in such a way that they are clearly visible and understood by all parties who must abide by the markings. Areas to be delineated in the field to assure compliance with the HCP are listed below:

Areas to be delineated in the field (or on maps if field marking is completely infeasible):

- Boundaries of MMCAs
- 300-foot vegetative buffer along northern Humboldt Redwood State Park/PALCO boundary
- 300-foot vegetative buffer from suitable marbled murrelet nesting habitat in Grizzly Creek State Park
- 0.25-mile seasonal buffer and 300-foot late seral harvest buffer between PALCO lands and old-growth marbled murrelet habitat on public lands
- 300-foot buffers at certain points along the south edge of the Headwaters Reserve and the northwest edge of the North Fork MMCA
- 1,000-foot buffer around Northern Spotted Owl (NSO) nest trees
- 500-foot radius circle (18 acres) around NSO activity centers (non-breeding)
- High and medium priority sites for road protective measures
- 0.5-mile buffers around bald eagle nests where there is a Class I stream within 1 mile of a THP
- 1 mile from a bald eagle nest tree where high noise activities are to take place
- 500-foot radius post-breeding season buffer around a bald eagle nest tree used during previous 5 years
- For peregrine falcon active nests, 0.5-mile disturbance buffer during the breeding season for most activities, or 1.0-mile for blasting, pile driving, helicopter yarding, and similar high-noise activities
- No-cut zone for trees within 500 feet of an active peregrine falcon nest shall not be cut without prior consultation and concurrence from the FWS and CDFG
- 1,000-foot breeding season buffer around any western snowy plover nest
- 50-meter no harvest zone around burrowing owl nest burrows
- 200-foot seasonal buffer around active bank swallow nest colonies
- Class I stream buffer bands (0-100 feet, 100-170 feet) slope distance from the watercourse transition line

- Trees to be retained in Class I RMZs (10 trees per acre greater than 40 inches DBH)
- Class II stream buffer bands (0-30 feet, 30-130 feet) slope distance from the watercourse transition line
- Trees to be retained in Class II RMZs
- Class III stream buffers (width based on slope)

Instruct – Persons responsible for monitoring and oversight of operations activities to assure HCP compliance will instruct all relevant field personnel (equipment operators, fellers, truck drivers, etc.) regarding the significance of the various field markings, the areas/resources to be protected or avoided, and the penalties for non-compliance.

Oversight – To scrutinize proposed protected areas shown on maps, as field markings, or of operations, by personnel responsible for assuring HCP compliance. These personnel can be company-designated personnel, independent third-party consultants under contract to public agencies but funded by the company, or resource agency personnel.

Follow-up – To make observations or measurements in the field, and to check information recorded on maps showing that field markings, exclusion zones, seasonal restrictions, snag/down log and leave tree requirements have been met.

Reporting – The preparation and filing with the appropriate authorities of documents reporting on all aspects of compliance, including violations, and the results of the compliance monitoring.

Remediation – The correction of a violation of the HCP by physical means (e.g., leaving more snags/downed wood on an adjoining THP when the leave requirements on the prior THP did not meet criteria; setting aside additional acreage in reserves for any acreage logged in protected areas, out of compliance with HCP). Not all provisions of the HCP are amenable to remediation (see remedies below).

Remedies – Monetary damages collected for violations of the HCP or non-compliance with specific implementation or monitoring provisions. The Implementing Agreement (IA), Section 9, contains some specific and other general provisions with regard to the government's right to extract remedies from the company in the event of failure to meet the terms of the HCP (Attachment 1). These remedies are to be supplemented with additional specific remedies for non-compliance with other specific mitigation or monitoring requirements of the HCP, as detailed in the matrices in the Final MMRP.

A. AQUATIC MONITORING

1. Compliance Monitoring

Compliance monitoring activities will contribute to the goal of achieving 100 percent prescription implementation. Compliance monitoring includes four components: third-party monitoring, THP checklist, the Best Management Practice Evaluation Program, and application of the compliance findings.

a. HCP Monitor

The HCP monitor, as described in section F-13, shall have full access to PALCO's land, at all times, to inspect any covered activity and shall be present on site during every timber harvest conducted by or on behalf of PALCO. The HCP monitor shall also, at the request of the wildlife agencies, monitor the effectiveness of the aquatic conservation plan.

b. THP Checklist

PALCO resource professionals preparing THPs and timber harvest exemptions and agencies conducting the environmental review of PALCO's plans will be guided by the Pacific Lumber Company Timber Harvest Plan Checklist. The checklist will be used to confirm that all relevant elements of the PALCO Aquatic Conservation Plan are contained in the THPs and made enforceable under the THPs.

PALCO and the wildlife agencies will revise the checklist during watershed analysis to create a THP checklist for each watershed to ensure implementation of watershed-specific prescriptions.

c. Framework: Best Management Practice Evaluation Program

PALCO will also conduct compliance monitoring as part of the "Framework: Best Management Practice Evaluation Program" (example attached). PALCO shall use this approach to document how well the aquatic strategy prescriptions are being applied. This program sets criteria for determining which THPs will be monitored and integrates compliance monitoring requirements with effectiveness monitoring to minimize personnel costs and maximize efficiency.

Attached is an example of a worksheet and a description of an evaluation procedure developed for the Best Management Practice Evaluation Program (BMPEP) of the Pacific Southwest Region of United States Department of Agriculture, Forest Service (USDA Forest Service 1992). This procedure is also used in a modified form by the California Department of Forestry and Fire Protection. The program identifies 28 hillslope evaluation procedures for implementation and effectiveness monitoring. The approach specifies how to sample sites to be evaluated, the timing and frequency of evaluations, details on what factors are to be rated, and other elements. This program has been the subject of an on-going review by the USDA Forest Service, the Environmental Protection Agency, and the State of California Water Resources Control Board.

PALCO will use the BMPEP framework to develop watershed-specific implementation and hillslope effectiveness monitoring protocols. PALCO will draft a separate evaluation procedure for related sets of prescriptions in the Aquatic Conservation Plan, including those listed on the "THP Checklist" (described above) and present each for review, revision, and final approval by the wildlife agencies. As watershed analysis is completed for each hydrologic unit, revised sets of evaluation procedures will be developed following the BMPEP framework.

The elements of the compliance and hillslope effectiveness evaluation program and protocols will include the following:

1. Statement of required qualifications of those who will conduct the monitoring.
2. Database and data storage, retrieval, and annual reporting requirements.
3. A procedure and criteria for developing a random sample pool of THPs and exemptions for each hydrologic unit from which THPs and exemptions are to be randomly selected and sampled.
4. A procedure and criteria for developing random sample pools of sites from among the randomly selected THPs and exemptions for each type of prescription to be evaluated for implementation and hillslope effectiveness.
5. A step-by-step procedure to identify sample site locations (e.g., for RMZs, roads, and harvest units) and the timing (e.g., after the first winter storms) of implementation and hillslope effectiveness monitoring for each of the prescriptions.
6. For each evaluation procedure, detailed descriptions a) of how parameters are to be measured and b) of rating criteria.
7. Confirmation that the relevant prescriptions were made part of the THP or exemption.
8. Compliance and hillslope effectiveness monitoring evaluation in the field at the appropriate time using an evaluation form and rating criteria developed for each prescription.

9. Procedures for timely forwarding of completed field forms, filing of forms, data entry, and database management and reporting to the reviewing agencies.
10. Procedures for timely corrective actions.

Initially, all THPs and exemptions in each hydrologic unit and calendar year that meet selection criteria approved by the wildlife agencies will be subject to compliance and hillslope effectiveness monitoring. Examples of selection criteria include plans where hillslope best management practices pertaining to erosion control and RMZs have been “tested” by winter storms, plans with specific geologic concerns, and others. PALCO and the wildlife agencies will develop selection criteria specific to the Aquatic Conservation Plan. Not every RMZ or road, however, in every THP and exemption need be evaluated. The individual random sample pools of sites for each related set of prescriptions will initially be comprised of at least 50 percent of the sites where the prescriptions are applied. The wildlife agencies, in consultation with PALCO, will decide whether this proportion of sites where prescriptions are applied will continue to be monitored. The decision will be based on the results of compliance and hillslope effectiveness monitoring presented in annual monitoring reports. In addition, the wildlife agencies will conduct quarterly audits of the compliance monitoring and annual audits of the hillslope effectiveness monitoring evaluations carried out by PALCO to help ensure monitoring protocols are being followed.

d. Application of Compliance Monitoring Findings

PALCO and the wildlife agencies shall identify recurring successes and problems with aquatic strategy prescription implementation by conducting 1) quarterly reviews of the compliance monitoring reports, 2) hillslope inspections, 3) and audits of how PALCO includes the aquatic strategy prescriptions in THPs and follows monitoring procedures. Problems with implementation shall lead to remedies that will include, but not be limited to, training of personnel, adjustments in registered professional forester’s and licensed timber operators’ oversight and supervision over contractors and field crews, changes in equipment, refinements of prescriptions, and regulatory sanctions.

EXAMPLE OF COMPLIANCE MONITORING MATRIX FOR AQUATIC RESOURCES
(For illustration only — Not Final)

ACTIVITY		Logging/logging roads		
RESOURCE PROTECTED		Aquatic resources		
MEASURE		<p>2) Road Stormproofing</p> <p>Roads will be stormproofed to the standards identified in Weaver and Hagans (1994) within the first 20 years of the plan, at a minimum rate of 750 miles per decade and 75 miles per year. Stormproofing conducted as part of THPs will count towards the yearly and per-decade totals. Stormproofing completed to the standards identified in Weaver and Hagans (1994) prior to issuance of the incidental take permit also count towards the first decade totals. Roads that are closed or decommissioned according to the standards in Weaver and Hagans (1994) are also considered stormproofed and can be counted towards the yearly and per-decade totals. When used in this plan, the term stormproofing describes a process which involves the following elements:</p> <p>(See Aquatic Conservation Plan in Appendix P for prescriptions for complete definitions of how measure to be implemented)</p>		
	GEOG. LOCATION	FREQUENCY/ TIMING	PERSONNEL/ AGENCY RESPONSIBLE	HOW CONDUCTED/MEASURED
SURVEY	Upcoming THP areas	Every year after end of winter rainy season	Consulting hydrologist/fluviat geomorphologist, with road maintenance crew	The assessments follow the Pacific Watershed Associates protocols (July 1998 Draft HCP, Volume II, Part O, with attachments). Generally, a trained observer walks a road segment looking for actual or potential occurrences of erosion, slippage, mass wasting, blocked or perched culverts, or other potential sediment sources. The assessment documents instances of Humboldt crossings, unstable fill slopes for roads and lands, water crossings that have a moderate to high potential for culvert blockage and/or diversion of stream flows onto the road bed, sufficient drainage and diversions of road drainage directly into the waters.
PLAN	as above	as above	Company road maintenance planner	Planning for corrective action: mapping of areas needing work, identification of the work to be done (e.g., dig up and replace stream crossings, install drainage structures, remove unstable fill, alter the road bed to reduce the potential for diversion of flows onto the road surface, and install rolling dips and/or water bars to route water and sediment) (e.g., per <i>Forest and Ranch Roads Manual</i>)
DELIMIT	as above	Prior to starting stormproofing work each year in the dry season	Company road maintenance planner	Place field markings indicating the work to be done at each spot (location) so that they will be clear to road maintenance crew

INSTRUCT	as above	Prior to starting stormproofing work each year in the dry season	Company road maintenance planner	Instruct crew in number of sites, types of work to be done, equipment needed, etc.
OVERSIGHT	as above	Prior to start of next winter rainy season	Consulting fluvial geomorphologist CDFG??	Consultant performs verification checks to determine that stormproofing has been completed according to specifications
FOLLOW-UP				
REPORTING			Company road maintenance planner reporting to all agencies	The roads database and GIS system are updated to show that the subject road has been stormproofed. The roads database will display where the treatments occurred, the extent (e.g., milepost), and the type of treatment. The information is reported to the agencies in the annual report.
REMEDIATION				If stormproofing falls short of requirements, additional miles must be included in the following year's work.

B. TERRESTRIAL RESOURCES

The detailed monitoring provisions for terrestrial species monitoring are still being developed. *Examples of the approaches that will be used for all compliance monitoring provisions are shown in the matrices below. These show the form, but not the final content of the means to show that PALCO is complying with the detailed requirements of the HCP/SYR.* The checklists for management activities described in the Operational HCP (Appendix P) will be maintained and provided to the agencies on an annual basis.

1. "List A " Wildlife Species

ACTIVITY		Logging		
RESOURCE PROTECTED		List A species		
MEASURE		Surveys, watercourse protection zones, seasonal no-harvest buffers around nest trees, etc. (see detail table following)		
	GEOG. LOCATION	FREQUENCY/ TIMING	PERSONNEL/ AGENCY RESPONSIBLE	HOW CONDUCTED/MEASURED
SURVEY		see detail table below	qualified ornithologists	Details specified in HCP
PLAN				
DELIMIT	see detail table (following)	beginning of respective nesting season	qualified ornithologist with compliance forester	Nest location is marked and a circular measurement of the required distance from the tree or trees is made using a string box or GPS locator. Trees at the perimeter of the protected zone are marked using flagging or spray paint in bright color (e.g., yellow)
INSTRUCT	THP area	prior to felling	compliance forester	Compliance forester shows timber operator and fellers the location of the nest trees and the exclusion areas.
OVERSIGHT	THP area	weekly or bi-weekly during timber operations	compliance forester (1 per ?? acres or nest sites)	Forester spot-checks areas with exclusion circles to make sure they have not been entered.
FOLLOW-UP		close of nesting season	compliance forester	Forester checks for integrity of the protected zone at the end of the nesting season when young have fledged.
REPORTING			CDFG	Annual (or other) report
REMEDATION				

LIST A WILDLIFE SPECIES SURVEY REQUIREMENTS

SPECIES	SURVEY LOCATION	TIMING	DETAILS OF SURVEY	RESTRICTION /BUFFER IF SPECIES FOUND
Nesting bald eagles	Reconnaissance level surveys* of watersheds THP areas in watersheds where eagles are likely to nest. For Class I streams within 1 mile of a THP, surveys to within 0.5 mile of the THP boundary on the stream side.	Pre-nesting season (March 1 - April 15)	Field personnel to be trained to recognize bald eagle nests and other signs of presence. If bald eagles observed during surveys, additional visits conducted to determine nesting status.	Consultation and concurrence from FWS and CDFG prior to harvest within 500 feet of any tree used for nesting in previous 5 years. For current nests, a 0.5-mile disturbance buffer during breeding season and 1 mile for high-noise activities.
American peregrine falcon	THPs less than 0.5 mile from Scotia Bluffs or Holmes Bluff sites and any other potential cliff nest sites, or 1 mile from an active nest site for projects involving blasting or pile-driving.	Breeding season (January 15 - August 15)	Field personnel shall be trained to recognize peregrine falcons and potential nesting habitat.	0.5-mile buffer during breeding season, no harvest for cable or tractor yarding and 1.0 mile for helicopter yarding, blasting, pile driving and other high-noise activities. No trees within 500 feet of an active nesting to be cut without prior consultation with FWS and CDFG.
Western snowy plover	If the distribution of the species extends above mouth of Van Duzen River, full protocol surveys above Rio Dell Bridge. In addition, reconnaissance level surveys to locate plovers, and full protocol surveys within 1 mile of wherever a plover was located.	If detected, observe for nesting during nesting season.	PALCO will increase survey intensity if the range of population is approach PALCO property.	1,000-foot operations buffer during nesting season or until nesting completed or failed. Additional mass wasting measures possible.
Pacific fisher	none required			Improved snag and down log measures
California red tree vole		see text under "Effectiveness monitoring"		
Bank swallow	Within 200 feet of road construction area.	Prior to new road construction crossing low-gradient Class I streams. If habitat exists, survey once in May and once in June.		Known or encountered nesting colonies to be avoided during May and June with a 200-foot buffer.

***RECONNAISSANCE LEVEL SURVEYS FOR NESTING BALD EAGLES:** The surveys will consist of visits to observation points along roads or other viewing locations which cover the areas depicted as known or potential foraging habitat on Map 31. The surveys will be conducted during the pre-breeding season (February 15 to March 15). Observation points along the transects will be established no greater than 0.5 mile apart. Surveyors will spend a minimum of ten minutes at each station, and search for bald eagles and other raptors using binoculars, or a spotting scope if necessary. Transects will be run a minimum of three times each, with two runs occurring in the morning (sunrise to 1100), and one in the afternoon/evening (1400 to sunset). At least one run for each transect must be conducted in March. All pertinent observations will be recorded. If reconnaissance level surveys are negative, no THP specific surveys are needed. If eagles are detected during the March survey, THP level surveys and actions will be initiated.

2. Marbled Murrelet

To determine where HCP conservation strategies are being implemented as written, the first step is to include methods for delineating the MMCAs on the ground using the GIS information and global positioning system (GPS) technology. Benchmarks should be established, and a systematic arrangement of markers (e.g., t-posts) should be placed. At ITP issuance and at regular (no more than five-year) intervals, it will be necessary to record the MMCAs using color aerial photography. Main haul roads proposed for use through and adjacent to the MMCAs shall be delineated and mapped in the HCP. These shall have a system of mile posts with markers each 0.5 mile and additional mileage markers at each culvert and stream crossing. At permit initiation and again at five-year intervals, it will be necessary to videotape each of these roads and adjacent forest, under suitable light and weather conditions, using a wide angle lens, recording each of the mileage markers on the videotape. Accompanied by interpretation of aerial photographs to estimate stand condition and age in second-growth and residual stands and periodic inspections by CDFG and FWS, these methods will accomplish the important elements of implementation monitoring. Additional discussion regarding the implementation of road storm proofing within the MMCAs will be appropriate to identify how this will be done.

Example of marbled murrelet compliance monitoring follows:

EXAMPLE ONLY – NOT FINAL

ACTIVITY		Logging		
RESOURCE PROTECTED		Marbled murrelet		
MEASURE		<p>Vegetative buffers: Along the northern Humboldt Redwoods State Park (HRSP)/PALCO boundary, from Highway 101 to approximately Snow Prairie, (See Volume V, Maps 25, 26) and for other adjacent HRSP lands, a 300-foot vegetative buffer from suitable marbled murrelet nesting habitat will be maintained. In the 300-foot buffer, the late seral silvicultural prescription (Regime Codes 121-125, selection every 20 years, retention of 240-square-foot residual basal area) shall be utilized as a minimum for stand retention after harvest.</p> <p>For the Grizzly Creek State Park public lands along Highway 36, a 300-foot vegetative buffer from suitable marbled murrelet nesting habitat will be maintained. In the 300-foot buffer, only the late seral silvicultural prescription (Regime Codes 121-125, selection every 20 years, retention of 240-square feet residual basal area) shall be utilized as a minimum for stand retention after harvest.</p>		
	GEOG. LOCATION	FREQUENCY/ TIMING	PERSONNEL/ AGENCY RESPONSIBLE	HOW CONDUCTED/MEASURED
SURVEY				
PLAN				
DELIMIT	Along the northern Humboldt Redwoods State Park (HRSP)/PALCO boundary, from Highway 101 to approximately Snow Prairie Grizzly Creek State Park public lands along Highway 36	Permanent for life of permit	Compliance forester	Park boundaries are marked with ???. The 300-foot distance outward of the boundary to be measured and marked by tin tags nailed to the trees 5 to 6 feet above the ground.
INSTRUCT		Prior to harvest of a THP adjacent	Compliance forester	Timber operator and fellers to be shown all of the trees delimiting the edge of the buffer.
OVERSIGHT			CDF	
FOLLOW-UP			Compliance forester	Inspection and re-marking each time the adjacent THP area is harvested (20-year cycle)
REPORTING				Initial annual report
REMEDATION				

III. EFFECTIVENESS MONITORING

A. AQUATIC RESOURCES

PALCO, with input from the wildlife agencies and from peer review panels, will craft hillslope effectiveness monitoring, instream effectiveness monitoring, and trend monitoring strategies for each hydrologic unit. The exact details of what, where, when, and how PALCO will be monitoring will be determined by questions and hypotheses posed by PALCO and the wildlife agencies. PALCO and the wildlife agencies will develop these monitoring objectives based on the findings of watershed analysis and other sources of assembled information.

PALCO will use effectiveness monitoring as a basis for evaluating the results of carrying out prescriptions on the features or processes that occur on the hillslope and on those in the instream environment. Hillslope effectiveness monitoring will help PALCO determine whether properly implemented prescriptions on the hillslope actually “work” (e.g., properly installed water bars actually prevented road surface rill erosion). Instream effectiveness monitoring will be used to determine whether the prescriptions result in protection of aquatic values (e.g., maintained or decreased percent of fine sediment in spawning riffles).

PALCO will monitor both instream and upslope conditions to assess the effectiveness of the Aquatic Conservation Plan. These effectiveness studies, in turn, will provide most of the impetus for the adaptive management component of the Plan.

Large Woody Debris and Riparian Buffers

PALCO will obtain baseline information on large woody debris (LWD) levels and recruitment potential from riparian stands during the watershed analysis process for each hydrologic unit as well as through ongoing resource assessment efforts, including those of CDFG. This information will also be collected as part of PALCO’s trend monitoring program (discussed below). PALCO and the wildlife agencies will develop questions and hypotheses to be tested through compliance monitoring and hillslope and instream effectiveness monitoring while using this baseline information.

PALCO’s hillslope effectiveness monitoring will determine whether forest stands within riparian buffers are developing increasing numbers of large trees. Information on stand conditions will be collected during THP preparation and review and through watershed analysis. As an initial indication of the effectiveness of correctly implemented prescriptions applied to riparian buffers, PALCO will show that currently understocked riparian stands will develop sufficient basal area and large trees to permit harvest.

Water Temperature

PALCO will monitor water temperatures during instream effectiveness monitoring and trend monitoring. PALCO will monitor instream water temperatures to see if recorded values show an increasing or decreasing trend over time. Water temperature data will be collected for at least 5 years to determine initial trends. PALCO will also determine the effectiveness of the aquatic strategy for temperature by monitoring changes in canopy closure over waters.

Sediment

In conjunction with instream effectiveness monitoring and trends monitoring, PALCO will monitor data on instream sediment levels, channel morphology, streambed aggradation/degradation, and biological metrics sensitive to sediment (e.g., invertebrate diversity).

PALCO will assess the effectiveness of the sediment control measures by monitoring sediment production rates from roads and hillslopes. In this way, PALCO will detect any shortcomings in

sediment control measures earlier than if the company depended only on instream conditions. PALCO will institute alternate management approaches to address identified shortcomings through the adaptive management process.

PALCO will conduct sediment source inventories as part of the watershed analysis process for each hydrologic unit. These studies will provide baseline data on the number, location, and size of sediment sources on the ownership. In addition, these studies will provide sediment budgets identifying the amount of sediment being delivered to waters from different sources. Within five years of completing the baseline sediment studies, PALCO will conduct follow up studies. These will determine the extent to which these sediment sources remain active and new sources develop (e.g., how many slides have occurred in the interim), their relationship to management activities, and how the rates of management-related surface erosion and landslides compare to the rates in the baseline period. PALCO will continue to inventory surface erosion within harvest units, bank erosion, new landslides, and road-related failures as they occur. These follow-up studies will continue to be completed at five-year intervals in conjunction with the watershed analysis revisitations for the life of the PALCO Aquatic Conservation Plan.

Hillslope and instream effectiveness monitoring and trends monitoring will provide the necessary information for determining how the PALCO Aquatic Conservation Plan affects sediment delivery to waters. In addition, because the follow-up studies will examine the relationship between management and sediment production, PALCO will use their results as guidance on how to modify management activities, if necessary, to reduce sediment production through the adaptive management process.

Sediment parameters are perhaps the most difficult on which to conduct effectiveness monitoring. Given this difficulty, PALCO will modify its approach for determining the effectiveness of sediment control measures as new data and scientific results become available.

Amphibian and Reptile Habitat and Population Monitoring

PALCO will work with the FWS and CDFG to develop an amphibian habitat module (e.g., for tailed frogs, southern torrent salamanders, and foothill yellow legged frogs) to be implemented during watershed analysis. As this module is applied across PALCO's ownership, information that will help in monitoring the effectiveness of aquatic prescriptions to protect amphibians will become available.

PALCO and the agencies will conduct instream effectiveness monitoring to determine the adequacy of the aquatic strategy for amphibian species. For this purpose, PALCO will use the temperature, sediment, and large-wood information that will be collected on both Class I and II waters. PALCO will modify amphibian monitoring efforts as new data and scientific results become available.

Cost-benefit Effectiveness

Cost-benefit effectiveness studies are needed to determine whether the benefits of protective measures being implemented by PALCO in the field are proportional to the costs to the company. Similarly, such studies could identify alternate mitigation approaches that continue to protect resources, but at lower costs to the company. At present, PALCO is generally able to identify the costs of specific mitigation measures with greater ease and certainty than it can identify the benefits of these measures to fish and wildlife. As PALCO obtains new information on the biological benefits of mitigation within the Aquatic Conservation Plan, PALCO will be able to more accurately assess the relationships between costs and benefits.

Hillslope Effectiveness Monitoring

Framework: Best Management Practice Evaluation Program

Refer to the discussion above regarding compliance monitoring for a description of the BMPEP.

Application of Hillslope Effectiveness Monitoring Findings

PALCO and the agencies will identify recurring successes and problems with the PALCO Aquatic Conservation Plan effectiveness on the hillslope by 1) conducting annual reviews of the hillslope effectiveness monitoring reports, 2) hillslope inspections, 3) and audits of monitoring procedures. Problems with hillslope effectiveness may lead to modification of prescriptions through adaptive management.

Instream Effectiveness Monitoring

The overriding objective of instream effectiveness monitoring of the PALCO Aquatic Conservation Plan is to determine, in a timely manner, whether the prescriptions applied to the hillslope are effective in protecting and improving the condition of aquatic resources. If prescriptions are not effective, this should be determined by PALCO and the agencies, and the prescriptions should be modified as soon as possible to prevent unanticipated adverse effects through adaptive management.

Instream effectiveness monitoring provides a means for assessing how individual prescriptions and management regimes as a whole are effective in protecting and restoring aquatic values. Instream effectiveness monitoring complements hillslope monitoring by providing a further basis for determining whether the prescriptions applied on the hillslope, including in riparian zones, are effective in controlling the rates and types of watershed inputs to waters. Because instream conditions integrate all watershed inputs, however, relating measurements of instream conditions to the effectiveness of individual prescriptions may be difficult (MacDonald and others 1991). Nevertheless, carefully designed instream effectiveness monitoring intended to answer specific questions can provide information that PALCO and the agencies can use to modify prescriptions and adapt management regimes to better protect water quality and aquatic species and their habitats.

Instream effectiveness monitoring, in contrast to trends monitoring, should be carried out as close as possible to where the impact mechanisms on the hillslope are at play. Instream effectiveness monitoring should occur in tributary waters, higher up in watersheds, or in locations intimately linked to hillslope processes. Monitoring conducted in such locations holds the greatest promise for establishing timely feedback mechanisms through which PALCO and the agencies can identify which prescriptions or procedures are not effective in protecting and restoring aquatic values and then modify them through adaptive management.

Instream Monitoring Approach

PALCO will develop and implement, with the oversight and concurrence of the agencies, instream monitoring approaches for two contexts: 1) watersheds where watershed analysis has not been completed and 2) watersheds which have been or are the subject of watershed analysis. PALCO, in consultation with the agencies, will design general instream effectiveness monitoring approaches for the former by using a combination of the following: baseline information compiled for the PALCO Aquatic Conservation Plan, other information as it becomes available through watershed studies, resource inventories and monitoring conducted or mandated by public agencies (e.g., CDFG, RWQCB, CDF and others), input from resource professionals familiar with conditions in the local watersheds, and the public living in or near the watersheds to be monitored. While designing the approaches for instream effectiveness monitoring in watersheds subject to watershed analysis, PALCO and the agencies will use these same information sources; however, the instream effectiveness monitoring designs will benefit from the focused watershed-specific assessments and syntheses that are integral components of watershed analysis. The PALCO will iteratively use these insights gained from the watershed analysis assessments and syntheses to design instream effectiveness monitoring elsewhere.

Instream Effectiveness Monitoring Objectives

All monitoring should be for the purpose of achieving focused objectives, answering specific questions or testing well-considered hypotheses. This is particularly true for instream effectiveness monitoring.

The following are examples of mechanistic null hypotheses that illustrate the types of questions that PALCO will answer through its instream effectiveness monitoring program:

- Hypothesis: There is no significant increase in streambank instability and scouring of Class III waters with gradients greater than three percent by the end of the first winter period after clearcutting through the application of Class III EEZ prescriptions.
- Hypothesis: There is no significant (less than 20 percent) increase in turbidity in Class II waters from the inflow of Class III waters adjacent to high lead cable-yarded clearcut harvest units through the application of the aquatic strategy Class III EEZ prescriptions.
- Hypothesis: After clear-cutting and high-lead cable yarding, there is no significant decrease in residual pool volume in Class I and II tributary reaches with gradients less than three percent. This is due to the effectiveness of riparian management zone widths, which hold materials transported from shallow-seated landslides in check.
- Hypothesis: There is no significant reduction of overstory tree canopy in Class II RMZs from wind throw after commercial thinning because of pre- and post-harvest tree stocking or RMZ widths, or both, reducing wind-related “depth-of-edge” effects.
- Hypothesis: There is no significant increase in summer (mid-July to mid-September) late-afternoon average maximum temperatures measured in pools in Class I waters because low water temperatures are maintained in contributing Class II waters.

These examples of hypotheses to be tested through instream effectiveness monitoring illustrate how carefully questions must be developed before designing and implementing instream effectiveness monitoring. They point to the need to establish criteria for determining what is “significant” (e.g., less than 20 percent), to clearly describe what exactly is to be monitored (e.g., turbidity vs. suspended sediment) and to specify where and when monitoring will occur (e.g., in Class III tributaries with gradients greater than three percent contributing to Class II waters from mid-July to mid-September, late afternoon). The hypotheses are stated in mechanistic terms to help ensure that the monitoring is directed toward investigating the linkages between prescriptions applied to the hillslope and instream conditions. They also suggest how testing one hypothesis through monitoring might lead to another, through an accumulative method of inductive inference. By employing such a process of “strong inference” (Platt 1964), PALCO and the agencies will clarify which prescriptions of the aquatic strategy are inadequately holding impact mechanisms triggered by management activities in check.

PALCO will develop these types of hypotheses and the instream effectiveness monitoring strategies with the participation of the watershed analysis team members and agencies. Where the watershed analysis process has not been initiated, PALCO and the agencies will develop sets of hypotheses to be tested through instream effectiveness monitoring. These hypotheses will be informed by the experiences gained elsewhere in the region, where watershed analysis has been completed. In both circumstances, the actual hypotheses to be tested will be determined by the salient circumstances, management regimes, and prescriptions specific to each hydrologic unit. Finally, PALCO and the agencies will establish a peer review panel to bring in interdisciplinary expertise to critique monitoring proposals on an annual basis, if necessary.

Application of Instream Effectiveness Monitoring Findings

PALCO and the agencies will use the results from the annual reviews of instream effectiveness monitoring to modify prescriptions that are identified as ineffective in protecting and restoring aquatic resources through the adaptive management process. At the same time, insights gained from this monitoring will confirm what prescriptions are working well. The changes in prescriptions will be designed to fit specific circumstances and impact mechanisms. For example, instream effectiveness monitoring might indicate that unacceptable increases in turbidity in Class III waters occur on certain soils after the adjacent stands on slopes greater than 50 percent have been clearcut, yarded by high-lead-cable, and broadcast burned. This may lead to PALCO modifying, among other things, the timing

of timber operations, the regeneration and yarding methods and the level of vegetation retained within EEZs under these circumstances. In contrast, if under otherwise similar circumstances, instream effectiveness monitoring suggests that little or no increases in turbidity are found when the adjacent hillslopes are subject to intermediate treatments (e.g., commercial thinning). Until there is evidence to the contrary, then, the management regime and prescriptions would be retained. The monitoring activity should continue long enough, however, to ensure that the prescriptions are tested under a wide range of conditions, including large but infrequent storm events.

B. TERRESTRIAL SPECIES MONITORING

1. Marbled Murrelet

The stated implementation goal is to determine whether the conservation strategies are having the predicted effects on marbled murrelets. The following questions address this implementation goal:

Are Marbled Murrelets Continuing to use MMCA Stands?

Methods to address this question must consider both maintenance and development of murrelet nesting activity in old-growth and residual stands within the MMCAs. Procedures other than protocol surveys might be used to produce usable data, particularly if variability could be reduced and surveys were concentrated into the period when detection frequencies were greatest.

Are Marbled Murrelets Nesting Successfully in the MMCA Stands?

To answer this question, new techniques must be developed. In the interim, the only meaningful measures of this are probably indirect.

2. American Peregrine Falcon

Monitor nest sites for which buffers are established during the breeding season each year the THP is in effect and for at least one year after. Report data to FWS and CDFG annually. Review monitoring results with FWS and CDFG at five-year intervals.

3. Red Tree Vole

Develop a research/monitoring effort to examine seral stage use and habitat connectivity requirements for the red tree vole on PALCO lands. Survey methodology will be based on the draft study plan developed by the Pacific Northwest Research Station (Biswell and Forsman, 1997). The research/monitoring project will commence by the end of the second year after permit issuance.

Between years 5 and 7 of the permit, PALCO, FWS, and CDFG shall use the results of monitoring/research activities and any other new information available on the species to evaluate the effectiveness of conservation measures. If changes to the operating conservation plan are necessary, and no agreement can be reached, the FWS and CDFG may terminate coverage for the California red tree vole under the incidental take permit.

Specifically, the silvicultural requirements associated with RMZs, mass-wasting avoidance strategy, cumulative effects/disturbance index restrictions, MMCAs, and the retention standard of 10% late seral habitat for each WAA would likely provide additional habitat for red tree voles. However, these additional mitigations would help sustain viable red tree vole populations within each WAA in the Project Area, through the life of the permit.

C. TIMBER STAND IMPROVEMENT MONITORING (SYP)

IV. TREND MONITORING

A. AQUATIC RESOURCES

According to MacDonald and others (1991), trend monitoring implies a process where measurements are made at regular, well-spaced intervals so as to determine a long-term trend in a particular parameter. This type of monitoring typically is not intended to evaluate specific management practices (as is the case with effectiveness monitoring). The results of trend monitoring, however, can corroborate the findings of effectiveness monitoring. Conversely, they can detect changes at different time and spatial scales from which effectiveness monitoring detects changes. Trend monitoring can also serve to indicate whether watersheds as a whole are on a long-term trajectory of recovery from both natural and management-related perturbations.

Adoption of the Current Trend Monitoring Program to the PALCO Aquatic Conservation Plan

PALCO already has a significant trend monitoring program in place on its lands. The company has installed 52 permanent sampling stations. At each station, aquatic macroinvertebrates, fine sediments, substrate size, and crown cover are measured. In addition, stream bed surveys and measurements of continuous temperature and large woody debris are conducted at a subset of the 52 stations. Details of the data collection/analysis efforts associated with this program are as follows:

- Aquatic macroinvertebrates are collected using methods in the California Stream Bioassessment Procedures prepared by Jim Harrington of CDFG. This methodology involves sampling riffle habitats using a kick net. Collected invertebrates are preserved in the field. In the laboratory, the samples are subsampled, and the first 300 invertebrates are identified to family, and, where possible, to genus. The samples are being identified by Lauck, Lee and Lauck Inc. Their results are used to calculate abundance (if less than 300), species richness (i.e., number of taxa), and the Simpson and Hilsenhoff diversity indices.
- Bulk sediment samples are being used to assess the percent of fine sediments (<0.85mm, and < 4.7mm) as an indicator of suitability for salmon spawning. PALCO is using the shovel sample technique as described in "Field Comparison of Three Devices Used to Sample Substrate in Small Streams" by Grost and Hubert, 1991. Collected samples are processed by CDFG under contract to the company.
- Pebble counts are being used to calculate the median and 84th percentile sediment size (e.g., D50 and D84). These sediment measures can be tracked over time to determine whether sediments in a watercourse are generally becoming coarser or finer, which relates to both sediment loading rates, and cumulative effects from management activities. Pebble counts are being collected using the method described in "Stream Reference Sites" by Harrelson et al. (1994).
- Measurements of water temperature over the summer are taken with continuous recording thermometers (Hobos or Stowaways). In addition, "point" measurements of temperature are taken during most other monitoring activities. Temperature data are used to calculate the maximum weekly average temperature (MWAT).
- Canopy cover (percent) is being used to identify areas that may be subject to higher thermal loading (e.g., from sunlight), and to document regrowth of riparian areas harvested in the past. Measurements are taken using a spherical densimeter using methods in Flosi and Reynolds (1996).
- Streambed surveys are being conducted to determine how streambed elevation is changing over time. This, in turn, is related to both sediment and LWD loading to waters. The methods

for these surveys were developed by Dr. Bill Trush (Humboldt State Univ.) in cooperation with Simpson Timber Company. The method involves measuring the elevation of the channel thalweg using an engineer's level and permanent benchmarks that can be used to compare results among survey periods. PALCO has also begun measuring channel cross sections using permanent benchmarks to track changes in channel width/shape over time.

- As part of the stream bed surveys, PALCO is measuring the abundance (i.e., percentage of channel length composed of pools), size, and depth of pools within each study reach.
- Large woody debris is being measured because of its value in creating fish habitat and to assess how much LWD recruits from riparian buffers along the stream. The diameter, length, and location of all LWD pieces in the thalweg mapping segments is being recorded yearly.

Although not currently a part of PALCO's trends monitoring program, PALCO intends to collect data on fish abundance, turbidity, and discharge in the future. For fish, PALCO will establish a number of survey reaches across the ownership. Where possible, these reaches will be selected to correspond to locations already being measured for the trends monitoring variables noted above. These survey reaches will be assessed twice yearly, during the summer (July-August), and again during the spawning season (for which the timing will vary from year to year). Summer surveys will be conducted using electrofishing, underwater observation, seining, angling, or other methods as appropriate, although preference will be given to quantitative methods if they are feasible. Spawner surveys will primarily be conducted using visual observation techniques, although trapping, seining, or angling may be used to collect individual fish for measurement, identification, or radio tagging.

Turbidity measurements were recommended in a review of PALCO's monitoring program prepared for EPA by Randy Klein (Klein 1997). Although expensive compared to other sampling efforts used in PALCO's monitoring program, Klein's review suggested that turbidity could be an effective way to determine whether fine sediment inputs to waters are increasing or decreasing over time. The company proposes to establish "pilot" turbidity monitoring stations. Results from this pilot program will be used to determine how and where to expand this program.

Historically, the USGS measured stream discharge at a series of stations on or adjacent to PALCO's land (e.g., Freshwater Creek, Larabee Creek). PALCO provided financial support for re-establishment of a gaging station on the Elk River and intends to continue operation of this gage. The company is also considering establishment of gaging stations on Freshwater Creek, Yager Creek, and possibly in one or more of the smaller watersheds draining into the Eel River (e.g., Bear Creek). This monitoring effort would also be relatively expensive. PALCO and the agencies' decision on where to undertake this program will be made in the future based on the results of the Elk River pilot and watershed analyses conducted there and in other hydrologic units.

PALCO recognizes that new data or scientific studies and the findings of watershed analysis will result in future identification of other variables that would be valuable to monitor. Therefore, at their discretion, PALCO and the agencies will add to the list of monitoring variables outlined here at a later date.

Klein (1997) discussed the distribution of monitoring sites on PALCO's lands and suggested installation of additional monitoring sites. PALCO agrees that some portions of its lands, for example, the Elk River drainage, have few monitoring sites relative to their land area. In part, this is a result of statistical chance, as many sites were chosen using randomization techniques. However, it is also true that the company made the decision to intensively survey the Freshwater and Lawrence Creek basins to more accurately assess the potential impacts of its forest practices. PALCO intends to continue this intensive approach to sampling in these basins, especially given concerns over the potential for cumulative effects. However, the company also anticipates adding new monitoring sites to fill any "holes" in its coverage. Selection of specific sites will be included as part of the watershed analysis process the company will be conducting on its lands.

PALCO and the agencies will review the current 52 monitoring locations and activities. They will confirm that the original intent underlying the selection of locations and instream parameters to be measured is consistent with the monitoring needs of the Aquatic Conservation Plan and follow the guidelines for monitoring found in the HCP Handbook (1996). This review will address and respond to comments from the public and the local watershed specialist regarding PALCO's current trend monitoring effort. PALCO and the agencies will provide important details regarding monitoring objectives and hypotheses, sampling and measurement methodologies, monitoring locations and distribution, frequency of sampling, and statistical analyses. These cannot be finalized and disclosed at this time, but must await the findings of watershed analysis, further quantitative and qualitative resource assessment and analysis (i.e., for the interim, for those hydrologic units where watershed analysis is not yet completed), or both. As stated in the HCP Handbook (1996), trend monitoring measures will be "...as specific as possible and be commensurate with the project's scope and the severity of its effects." Further, PALCO and the agencies will develop target milestones for the life of the HCP for key instream parameters. These will necessarily be specific to each hydrologic unit, as their development must be informed and conditioned by prevailing physical conditions specific to each hydrologic unit.

As a further assurance that PALCO's trend monitoring program will follow the guidelines of the HCP Handbook (1996) and show clear trend information on the condition of waters in watersheds effected by implementation of the Aquatic Conservation Plan, PALCO and the agencies will establish a peer review panel comprised of scientists, resource professionals, and the public living in and near the hydrologic units to be monitored. The panel will review the initial trend monitoring strategies developed by PALCO and the agencies and provide recommendations for improvements. The peer review panel will validate that appropriate questions are being asked and that the proposed monitoring strategies are practicable and will give answers and management directions. The ultimate form of the trend monitoring will be approved by the reviewing agencies through the watershed analysis process.

Application of Trend Monitoring Findings

As stated above, trend monitoring alone is not an appropriate tool to evaluate the responses of watersheds and waters to specific management practices. This form of monitoring can, however, be used to assess whether hillslope and instream attributes and functions are leading toward or away from properly functioning conditions and recovery. With the oversight of the agencies through annual reviews and the THP review process, PALCO will use the results of trend monitoring as part of the cumulative effects analyses in watershed analysis. PALCO will in turn, where appropriate, affect watershed-specific modifications in management regimes to reverse trends that lead way from properly functioning aquatic habitat conditions through the watershed analysis prescription process or adaptive management.

B. TERRESTRIAL SPECIES

1. Marbled Murrelet

What are the trends in local marbled murrelet populations?

This question will requires surveys of at-sea populations to monitor trends. The Final MMRP must describe the expected frequency of surveys, proposed methods, and reporting procedures, especially with respect to the timely provision of complete data sets and analyses to FWS and CDFG.

What is the distribution of habitat in the bioregion?

Locally on PALCO land, this question should address the improvement of residual habitat within the MMCAs whereby old-growth trees come to be sheltered by the maturing second- growth redwoods, and adjoining second growth provides effective buffers. Similar procedures for buffers within MMCAs

and adjoining public lands can be followed. At issuance of the ITP, and following at five-year intervals, the development of these habitats shall be reported to CDFG and FWS, using GIS mapping techniques at appropriate scales of analysis.

2. Bank Swallow

For any nest colonies within 200 feet of a construction area. PALCO shall monitor the nest colony each year that the covered activity operates within 300 feet of the site and for one year following cessation of the operations. Monitoring shall determine the approximate dates that the colony is established and abandoned and the approximate number of adult birds. It shall also document any indication that disturbance adversely affects success of the colony.

V. ADAPTIVE MANAGEMENT

A. AQUATIC SPECIES

Adaptive management will be used to change elements of the aquatic conservation plan in response to determination of effectiveness of current elements of the conservation plan for protecting and restoring stream conditions and fish populations. Thus, the effectiveness of the conservation plan is assessed by examining conditions on PALCO's ownership and determining if management is maintaining or substantially moving towards achievement of key properly functioning aquatic habitat conditions.

Changes in elements of the conservation plan are warranted if watershed analysis, monitoring, or any of the scientific studies or new information from outside the Plan show that properly functioning aquatic conditions are not being maintained. They are also warranted if the Plan does not substantially move the aquatic habitat towards achieving key properly functioning conditions, or if a more cost-effective technique exists to attain the same biological or physical outcome. Adaptive management is the means to ensure that the conservation plan maintains or substantially moves towards achieving the habitat goal of a properly functioning aquatic condition.

PALCO may propose changes to elements of the conservation plan as part of adaptive management. The wildlife agencies shall approve any changes to the conservation plan. The wildlife agencies may also propose changes, for PALCO's consideration, based on the watershed analysis, monitoring, scientific studies, or new information in order to maintain or substantially move towards achievement of key properly functioning aquatic habitat conditions.

B. TERRESTRIAL SPECIES

1. Northern Spotted Owl

After five years, PALCO may present for review by the Scientific Advisory Panel, alternative activity site retention models to substitute for Level One and Level Two protection. Alternative activity site retention models shall not be implemented until they have been reviewed and approved by the FWS and CDFG.

PALCO, FWS, or CDFG may at any time propose modifications to characterizations of NSO suitable habitat. The Scientific Advisory Panel shall review applicable information and provide a recommendation to PALCO, FWS, and CDFG, who shall mutually agree upon any modifications.

Management objectives may be modified if new information becomes available following review of the Scientific Advisory Panel and approval by FWS and CDFG.

The seasonal bounds and duration of the prohibition on harvesting adjacent to activity sites may be modified based upon ownership specific information provided at PALCO's discretion upon review by the Scientific Advisory Panel and approval by FWS and CDFG.

If the applicable management objective for the number of activity sites is not achieved for any year of Plan operations, or if PALCO is unable to identify Level One protection sites for any reason, PALCO, FWS, and CDFG shall jointly develop modified or additional measures to conserve activity sites, including the potential implementation of no-take management procedures.

Reproductive rates and the proportion of activity sites occupied by pairs and shall be averaged over running five-year periods. If the five-year average for either parameter does not meet the management objective, PALCO shall, in consultation with FWS and CDFG, jointly develop modifications for conservation measures.

If the size of PALCO's ownership changes, the minimum required number of activity sites and the number of sites receiving Level One protection may be modified commensurate with changes in size of the ownership.

These additional mitigation measures will provide greater assurance of the persistence of a viable population of northern spotted owls on PALCO lands, increase the sensitivity of the monitoring plan to changes in spotted owl populations, and improve the ability of management plans to respond to changing conditions.

VI. FUNDING

The means to guarantee funding over the life of the permit for the mitigation and monitoring activities under the HCP/SYP is still being worked out between the government resource agencies and the company. The funding plan is to be designed to ensure that all of the provisions of the aquatic and terrestrial components of the MMRP can be carried out on an ongoing basis for the life of the permit. Funding is required as part of the Final MMRP.

VII. ATTACHMENT 1—REMEDY PROVISIONS FROM IMPLEMENTING AGREEMENT

A. REMEDIES, ENFORCEMENT, AND DISPUTE RESOLUTION

1. Remedies

Each party shall have all remedies available in equity to enforce this Agreement, the Federal Permit, the State Permit, and the HCP.

1. No party shall be liable in damages to any other Party or other person for any breach of this Agreement, any performance or failure to perform a mandatory or discretionary obligation imposed by this Agreement or any other cause of action arising from this Agreement. Notwithstanding the foregoing sentence:
 - a) Retention of liability: Each Party shall retain whatever liability it would possess for its present and future acts or failure to act without existence of this Agreement.
 - b) Landowner liability: Each Party shall retain whatever liability it possesses as an owner of interests in land.
 - c) Enforcement authority of federal and state government. Nothing contained in this Agreement is intended to limit the authority of the United States government or the State of California to seek civil or criminal penalties or otherwise fulfill its enforcement responsibilities under FESA, CESA, or other applicable federal or state law. For purposes of applying the penalty provisions of the FESA and other federal law, and CESA and other state law, each instance of harvest, destruction, or cutting of a single merchantable viable tree (8 inches or larger dbh) in violation of the terms and conditions of the federal permit shall be deemed a separate violation of such permit, the FESA and the FESA's implementing regulations and each instance of harvest, destruction, or cutting of a single commercially viable tree in violation of the terms and conditions of the state permit shall be deemed a separate violation of such permit, the CESA and the CESA's implementing regulations.
2. Injunctive and Temporary Relief. The Parties acknowledge that injunctive and temporary relief may be appropriate to ensure compliance with the terms of this Agreement.
3. PALCO, CDFG, and CDF acknowledge that specific provisions have been included in the HCP and IA in order to meet the conditions specified in AB 1986. These conditions include, among others, those relating to buffers on Class 1 and Class II watercourses; other restrictions relating to Class I, Class II, and Class III watercourses; implementation of the watershed analysis process; prohibitions on activities within areas designated as MMCAs; conditions on road-related activities; and the consistency of timber harvesting plans submitted by PALCO with the HCP. Violation of any of these provisions will subject PALCO to all the remedies and enforcement mechanisms available to CDFG, CDF, and the State of California, including those set forth in this Agreement and those provided by applicable statutes and regulations. Such remedies and enforcement mechanisms include, without limitation, suspension and revocation of the State Permit by CDFG (IA Section 8.3); the imposition of civil and criminal penalties under CESA and the California Business and Professions Code; and (ADD CDF REMEDIES). Any violation of provisions related to AB 1986 will also subject PALCO to the remedies and enforcement mechanisms available to the United States and the federal Wildlife Agencies under the FESA and other applicable federal law.